

Quotations from the Liberty Investigation Reports
Identified by Ron Linkenback, Greg Rockrohr, and Bruce Larson
Compiled by Roy Buxton
November 7, 2001

This document is intended to help show that Liberty Consulting Group found information during its investigation of ComEd's electric distribution system reliability that led it to conclude that ComEd had under-funded its distribution construction program for several years.

First Report, Chapter 3

Recommendation Three-1 ComEd should dedicate the necessary funds to maintain and improve the reliability of its T&D system. (page III-18)

"It is likely that a root cause of many of the service interruptions experienced by ComEd's customers in recent years relates to less than adequate funding of T&D activities during the 1990s." (page III-18)

"During the period 1992 through 1998, ComEd's T&D capital and O&M expenditures declined. Moreover, especially with regard to capital, T&D received a diminishing share of a corporate budget that sometimes grew substantially. It is clear that this situation was not accidental." (page III-15)

"There were signs that ComEd's cost control efforts were having an adverse effect on T&D's ability to serve its customers." (page III-16)

First Report, Chapter 4

Conclusion 3 ComEd's use of reliability data and analyses was not effectively used to influence decisions about the distribution system. (page iv-14)

"Prior to 1999, ComEd did not place a high priority on the use and value of reliability information. The apparent attitude was simply to fix problems as they occurred and then to move on to the next problem. While restoration of service from an interruption should be the top priority, a little time spent on accurate recording of outage information, and appropriate follow-up investigation of outages, is an effective way to be able to make smart decisions that would prevent or mitigate similar outages in the future. Even when serious problems became apparent, the initial approach seemed to be to throw money at the problems rather than implementing a smart and effective program. ComEd did not take reasonable steps to ensure that it collected consistent and accurate reliability information. There was little if any outage follow-up investigative work.

The company was not timely in its development of the interruption reporting system that was widely recognized as necessary for effectively using reliability information. The organization was not conducive to good input from reliability engineers to planning and maintenance. Without the information and without the communications, there is little reason to believe that reliability influenced system decisions.” (page IV-14)

Recommendation Four-1 ComEd should demonstrate, and the ICC may choose to independently confirm, that the company is effectively using reliability information.” (page IV-12)

The following quotes point to inefficiencies and ineffectiveness of ComEd expenditures (including capital expenditures) due to non-utilization of reliability information.

“On a more general basis, Liberty’s view is that ComEd’s large number of outages and poor performance in 1998, the attention brought to T&D reliability by the ICC, and the increased reporting requirements required by the ICC motivated ComEd to give a higher priority to T&D reliability. For example, ComEd’s reliability reports to the ICC in years prior to 1998 did not state the cause of outages. Internal reports in prior years were filled with information and were presented in a professional manner, but they lacked specific conclusions and recommendation.⁴⁶ While outside the scope of this review, Liberty could not help but be aware of the many changes ComEd implemented after the July-August, 1999, outages in Chicago. Liberty did not evaluate these changes, but it was clear that programs for reliability enhancement were receiving a higher priority after mid-1999 than in prior periods.” (page IV-11, 2nd paragraph)

“Nevertheless, these results show what could have been accomplished by ComEd if the reliability of the T&D systems had been given a higher priority in earlier years.” (page IV-12, last paragraph)

First Report, Chapter 5

Recommendation Five-1 ComEd’s method of making electric load adjustments for the effects of weather was inadequate. (page V-19)

“When combined with the potential understatement of possible peak load conditions caused by ComEd’s use of an “average” peak-day weather-load adjustment, ComEd created a burden its electric system could not bear under the pressure of severe hot weather.” (page V-3)

“ComEd estimated that it will take about two to three years to complete all of the upgrades and additions identified as result of the new planning design temperature. This appears to be a reasonable estimate.” (page V-17)

Recommendation Five-2 ComEd should implement a “First Contingency” criterion for its distribution feeder design process. (page V-20)

“The benefit of implementing such a criterion (e.g., in no case should any element in the system be designed to operate above 100 percent of its “normal” rating when the system is in its usual configuration) would be a more reliable electric delivery system. Anytime a system is operated above its “normal” capacity, loss of equipment life occurs.” (page V-20)

“High average loadings leave insufficient or no operating margin for both normal operations as well as emergency operations. This situation was exacerbated by ComEd’s adoption of a 105 percent, and sometimes a 110 percent overload standard for justifying new system reinforcement projects during periods of capital budget reductions.” (page V-17)

First Report, Chapter 7

Recommendation Seven-2 ComEd should implement a program to install fuses on all laterals and taps in accordance with the ComEd Standards. (page VII-23)

“ComEd was not following its current standards to fuse laterals and taps from the main feeders.” (page VII-23)

“The lack of fuses on all feeder laterals or taps has contributed to poorer reliability on the distribution system than should be expected.” (page VII-19)

First Report, Chapter 8

Conclusion 5 ComEd did not meet good utility practices for lightning protection of its substations rated 138kV and below. (page VIII-17)

Conclusion 7 ComEd did not have adequate lightning protection for its underground transmission line cables. (page VIII-17)

“ComEd’s underground transmission cables had no lightning arrester protection and, in many cases, these cables originated or terminated in substations that had no direct-stroke lightning protection with shield wires.” (page VIII-17)

“Therefore, ComEd did not meet good utility practices in protecting its substations from lightning, other than 765kV, 345kV, and certain 138kV substations.” (page VIII-11)

Recommendation Eight-3 ComEd should install shielding in all new substations to provide direct-stroke lightning protection. Furthermore, ComEd should review all existing substations and develop a program to provide direct-stroke protection where economically feasible. (page VIII-19)

Recommendation Eight-5 ComEd should provide lightning protection for underground transmission lines. (page VIII-19)

“The lightning protection standard should include as a minimum direct-stroke protection and lightning arresters. ComEd has a major investment in underground cable. Moreover, many of the underground transmission line cables are essential to reliable service, especially in the downtown Chicago region. Proper direct-stroke shield protection of the underground cable terminations and proper lightning arrester protection at the terminals is a minimal investment to provide lightning protection to the underground transmission lines.” (page VIII-19)

First Report, Chapter 10

“The results of ComEd’s own inspections showed that the distribution was in need of considerable repair. This finding is consistent with others observed by Liberty such as deferred maintenance and reduced personnel to perform work, mostly likely caused by reduced capital and maintenance expenditures.” (page X-11)

First Report, Chapter 11

Recommendation Eleven-6 ComEd should complete upgrade work that is planned. (page XI-37)

“However, some of the substation construction and upgrade projects had been delayed, at least partially due to budget limitations.” (page XI-29)

“Needed substation upgrades at Northwest and LaSalle had not been executed in time to provide additional back up to equipment that failed in the summer of 1999. Construction and upgrading were not performed so that overload conditions would not occur.” (page XI-26)

“ComEd was not able to complete some scheduled substation upgrades, such as at LaSalle and Northwest Substations, in timely fashion. The LaSalle 69kV to 138kV upgrade required nine years to complete. ComEd indicated that there were difficulties in obtaining permits and obtaining outages, but they also lowered the priority for completing the project for economic reasons. The delays in

completing substation upgrade work jeopardized reliable electric service.” (page XI-16)

Second Report, Chapter 15

Conclusion 1 The amount of ComEd’s distribution system construction did not keep pace with system growth and the need for refurbishment.

“ComEd’s budget cutbacks that began in 1993 did not permit an amount of construction that was consistent with the age, load, and growth of ComEd’s distribution system.” (page XV-12)

Recommendation Fifteen-1 ComEd should increase its distribution construction to a level necessary to keep up with distribution conditions and load growth.
(page XV-14)

“As discussed in Chapter Ten – System Conditions, many of ComEd’s distribution circuits were overloaded in 1999, due to the ComEd’s planning and budgeting. To minimize the recurrence of overloads and maintain system reliability, ComEd should be aggressively upgrading its distribution facilities.”
(page XV-14)

This section relates that ComEd’s construction standards are OK, but that not enough construction took place after 1992, based on distribution system size.
“Liberty also determined that the amount of distribution system construction that ComEd performed after 1992 was not consistent with the age and growth of the distribution system.” (page XV-2)

TRANSMISSION.

Although the following sections refer to transmission, many of the devices that are discussed fall under the account designation of high voltage distribution, which is ICC jurisdictional.

Third Report, Chapter 19

Conclusion 2 ComEd's transmission system planning philosophy was reasonable as far as it went. However, the philosophy was incomplete. (page XIX-22)

"ComEd's transmission system planning philosophy was to meet NERC's single contingency rule, MAIN's credible contingency rule, and ComEd's own specific set of credible contingencies that were as probable as ComEd's selected planning benchmark multiple contingency: the simultaneous outage of one generator and of one transformer while loads were greater than 100 percent of forecast but less than 105 percent of forecast. However, ComEd's planning philosophy was incomplete in that it failed to include those common mode failures and coupled contingencies which, while they may be less probable than ComEd's benchmark, nonetheless posed such high outage notoriety risk as to deserve their own criteria niche." (pages XIX-17 and 18)

Conclusion 3 ComEd's transmission system planning was based on an inadequate load forecast. (page XIX-23)

"ComEd's transmission system planning was based on the five-year feeder forecast and the corporate long-term load forecast. The five-year feeder forecast was inadequate because it was based on median weather. During hot weather, this caused ComEd's most temperature sensitive feeders to be at great risk. Transmission lines were sized to survive at least a single contingency. If there was no contingency, then transmission lines were barely stressed at all. However, if a contingency were to occur, and if the transmission lines were only sized to survive that contingency under median temperature loads, then it is possible that the transmission lines might not survive that contingency during hot weather." (page XIX-12)

Third Report, Chapter 21

Conclusion 3 There was no evidence of inadequate cost or quality controls in ComEd's transmission line construction. (page XXI-6)

"On the basis of Liberty's inspections and document review, the Lockport-Lombard line appears to have been built to ComEd's transmission standards. Costs for the Lockport-Lombard line evolved from \$37 million to perhaps as much as \$63.4 million due to accelerating project completion, expediting material, engineering and design changes that increased the size and number of poles required, and increasing the area of environmental restoration. However, the acceleration complicates the cost of the line to the point where Liberty cannot reach a definitive conclusion as to whether the line's construction was under adequate cost control." (page XXI-6)

Third Report, Chapter 24

Conclusion 3 ComEd had 278 problematic Bakelite joints on its underground transmission system and no plan to replace them. (page XXIV-9)

As of the summer of 1999, ComEd had many Bakelite joints on its transmission system. Some of those joints failed during the summer 1999 outages. These joints were a weak link in the underground transmission cables due to their propensity to fail. ComEd developed a plan to replace these joints only after the severe reliability problems that occurred in the summer of 1999. Good utility practice would have replaced these joints or at least had a definitive plan to replace them. (pages XXIV-9)
